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Abstract

This paper presents an empirical investigation of the critical determinants for the adoption of e-market in Australian small-and-medium sized enterprises (SMEs) within the technology-organization-environment (TOE) framework. A conceptual model is proposed for better understanding the adoption of e-market in Australian SMEs. Structural equation modelling is used for testing and validating the conceptual model based on the survey data collected from Australian SMEs. A consequent logistic regression analysis on the validated adoption model shows that there is a positive relationship between perceived direct benefit, top management support, external pressure, trust and the adoption of e-market, among which top management support emerges as the most critical determinant. The perceived indirect benefit, size and organization readiness, however, do not show a significant influence on the adoption of e-market in Australian SMEs. The implications of this study highlight the criticality of top management support in the adoption of e-market in Australian SMEs.

Keywords

E-Market, Small-and-Medium Sized Enterprises, Technology Adoption, Technology-Organization-Environment

INTRODUCTION

Electronic market (e-market) is a virtual marketplace in which buyers and sellers are brought together in one central market for conducting electronic commerce activities including the exchange of goods, services or information online (Dou and Chou, 2002; Grieger, 2003). It has become increasingly popular due to its potential benefits to business, especially to small and medium sized enterprises (SMEs), including strengthened customer relationships, ease of reaching targeted markets, improved efficiency, reduced costs, and greater competitive advantage (Daniel et al., 2004; Standing et al., 2010).

The potential of e-market for SMEs, however, has not been fully utilised. A majority of SMEs has not made use of e-market. Those who have adopted e-market one way or another have not moved beyond the entry-level adoption (Molla and Licker, 2005). This is due to various obstacles that SMEs face in adopting e-market, particularly the lack of ability to overcome significant technical, organizational and environmental issues (Zhu et al., 2003; Duan et al., 2010). Such issues, however, have not been well studied in the e-market adoption literature (Standing et al., 2010). In particular, what is missing from the existing literature is (a) a theoretical framework specific to the adoption of e-market, (b) the validated measurement model for the e-market adoption, and (c) an empirical assessment of the critical determinants for the adoption of e-market in Australian SMEs.

This study seeks to address these issues by proposing a conceptual model for the adoption of e-market in Australian SMEs within the technology-organization-environment (TOE) framework. Structural equation modelling (SEM) is used for testing and validating the conceptual model for the adoption of e-market based on the survey data collected from Australian SMEs. A consequent logistic regression analysis on the validated research model reveals that there is a positive relationship between perceived direct benefit, top management support, external pressure, trust and the adoption of e-market, among which top management support emerges as the most critical determinant. The perceived indirect benefit, size and organization readiness, however, are less influential in the adoption of e-market in Australian SMEs.

The remainder of the paper is organized as follows. The next section reviews the relevant literature on the TOE framework. Within this framework, a research model and hypotheses are presented, followed by the research method, analysis and discussion. The last section draws the conclusion.

THEORETICAL BACKGROUND

The TOE framework (Tornatzky and Fleischer, 1990) is a comprehensive tool for studying the adoption of technology in an organization. It identifies three aspects of an organization that influence the adoption of new

technology including organization, technology, and environment. The technology aspect depicts the technologies that are relevant to the organization in its pursuit of the business objectives. The organization aspect is defined by several descriptive measures including firm size and scope, managerial structure and internal resources. The environment aspect describes the macro area in which an organization conducts the business, with business partners, competitors and the government. Factors categorized in these three groups are deemed to affect the decision of an organization towards their adoption of latest technologies.

The applicability of using the TOE framework for investigating the determinants in technology adoption in SMEs is exemplified in existing information systems literature (Iacovou et al., 1995; Kuan and Chau, 2001; Zhu et al., 2003). Iacovou et al. (1995), for example, apply the TOE framework for exploring the adoption of electronic data exchange (EDI) in small businesses, leading to the identification of the perceived benefit, organizational readiness, and external pressure as the critical factors in the adoption of this technology. Kuan and Chau (2001) validate the suitability of the perception-based TOE framework in exploring the driving forces for the EDI adoption in small businesses. Zhu et al. (2003) state that the TOE framework is an appropriate theory for investigating the adoption of technology in SMEs.

The suitability of the TOE framework for studying the adoption of e-market is demonstrated in Swanson (1994)'s research where the adoption of technology innovation along the line of the TOE framework is examined based on the three types of technology innovations. The result shows that the TOE framework is able to fully explain the type of innovation embedded in the core of the business in the technology adoption process. E-market falls into this type of innovation, in the sense that e-market strengthen organizational competitiveness and can streamline the integration the business with suppliers and customers (Duan, et al., 2010). This shows that the TOE framework is well suited for studying the adoption of e-market.

The solid theoretical basis and the consistent empirical support discussed as above promise that the TOE framework can be extended for studying the adoption of e-market in Australian SMEs. This study will use this framework to develop a model that can be used to investigate the critical determinants for the adoption of e-market in Australian SMEs giving the specific nature of Australian SMEs.

RESEARCH MODEL AND HYPOTHESIS

Through a comprehensive review of related literature on the adoption of e-market within the TOE framework, this section presents a conceptual model for facilitating the investigation of the adoption of e-market in Australian SMEs. Figure 1 presents this research model with four dimensions including technology, organization, environment and trust, discussed in the following.

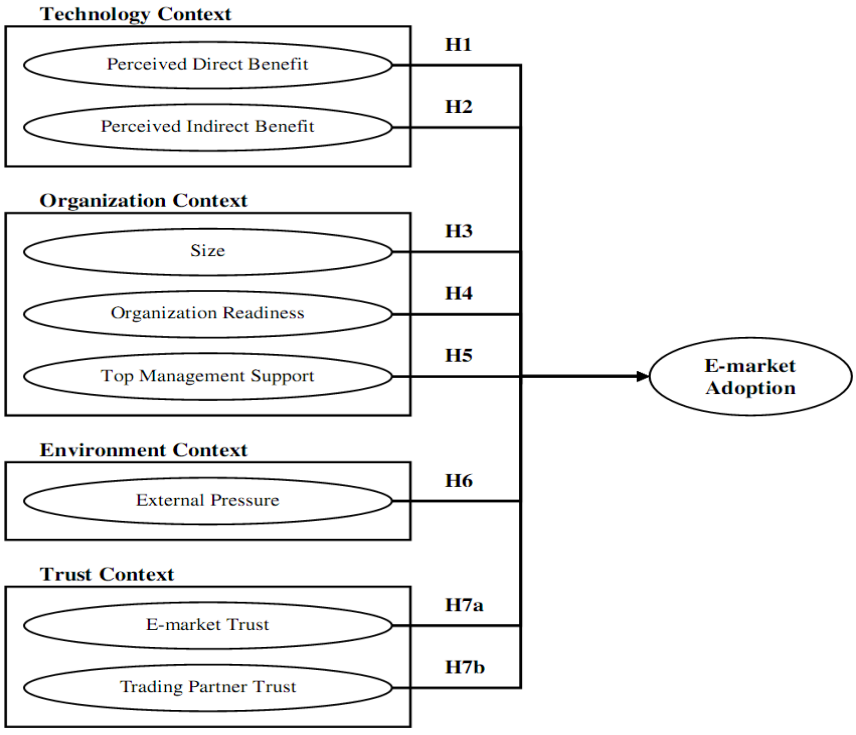

Figure 1: A conceptual model for the adoption of e-market

Technology

The technology dimension considers the perceived benefit of adopting e-market in an organization. The perceived benefit positively affects the adoption of technology in an organization (Rogers, 2003). Organizations adopt technology when there is a perceived need for using the technology to overcome a perceived performance gap or exploit a business opportunity. The greater the perceived benefit, the more likely an organization will adopt the technology. In the adoption of e-market, the perceived benefit is classified into the direct benefit and the indirect benefit (Joo and Kim, 2004). The direct benefit is related to the reduction of operational savings and the tangible benefit in the organization such as the access to a larger number of suppliers or customers, increased price transparency, and saved operation costs (Kuan and Chau, 2001; Joo and Kim, 2004). The indirect benefit is associated with the impact of adopting e-market on the management of business process and customer relationships. It refers to improving the company's image, increasing operational efficiency, and improving trading partner relationships (Daniel et al., 2004; Standing et al., 2010). The above argument leads to the following hypothesis:

H1: The perceived direct benefits positively influence the adoption of e-market.

H2: The perceived indirect benefits positively influence the adoption of e-market.

Organization

The organization dimension includes the size of an organization, the organizational readiness and the top management support. The size of an organization directly affects the adoption of technologies in the organization (Rogers, 2003). Large organizations usually have greater ability to adopt innovations. One possible explanation is that larger organizations have more financial and technical resources for taking risks with new technologies than smaller organizations. Bakos (1991) indicates that the cost and expertise required to build or adopt an e-market might favour big organizations. Even within the small business category, a relatively larger organization is in a better position to engage in e-market. It then leads to the following hypothesis:

H3: Organization size is positively related to the adoption of e-market

Organization readiness is determined by the financial readiness and the technological readiness. The financial readiness of an organization refers to the financial resources available for e-market installation costs and for ongoing expenses. The technological readiness is related to the level of sophistication of IT usage and IT management in an organization. The extent by which an organization utilizes IT such as electronic funds transfer, EDI and Internet has a positive impact on the system integration with e-market (Barry and Milner, 2002). Based on the above argument, the following hypothesis is proposed:

H4: Organization readiness is positively related to the adoption of e-market

Top management support is critical in SMEs for creating a supportive climate and providing adequate resources in adopting technology. It ensures the limited resources and technical expertise to be allocated for supporting the essential needs of new technology (Ramdani et al., 2009). It helps overcome barriers and resistance to change in the organization. An SME that is likely to adopt e-market will most often have the support of top management who have a positive attitude towards the adoption of technology, who are innovative and who are knowledgeable about IT. This discussion leads to the following hypothesis:

H5: Top management support positively influence the adoption of e-market

Environment

The environment dimension concerns about external pressure. External pressure refers to the pressure from competitor, trading partners and the government to the organization (Chwelos et al., 2001). The presence of pressure from competitors often forces individual organization to adopt technology for being competitive in a dynamic environment. In the adoption of e-market, organizations are more prone to adopt e-market as competitors become more e-market capable (Stockdale and Standing, 2004). The existence of pressure from trading partners or government departments also has great influence in the decision of an organization for its adoption of technology, especially SMEs in the sense that they are more likely to be economically dependent on their larger partners for survival. Thus, the following hypothesis is proposed:

H6: External pressure is positively related to the adoption of e-market

Trust

The trust dimension considers the degree of trust in e-market and trading partners by SMEs in the adoption of e-market. It is included to extend the TOE framework in this study due to the nature of e-market considering that the main communication method for all parties is online. Both economists and sociologists agree that trust is a

crucial enabling factor in relations to the adoption of online technology (Pavlou and Gefen, 2004). The trust in e-market refers to the trustworthiness of the e-market in handling transactions, securing systems and maintaining relationships when operating the system. The trust in trading partners concerns the trust in the trading partners to conform online transaction rules such as for buyers to pay on time, or for suppliers to provide valid product or service information. The above argument therefore leads to the following hypothesis:

H7a: Trust in e-market is positively related to the adoption of e-market

H7b: Trust in trading partners is positively related to the adoption of e-market

RESEARCH METHOD

Data collection

Survey is a technique for studying the cause of phenomenon as well as the attitudes and behaviours of certain group of people, providing with empirical evidence (Creswell, 2003). The use of survey is considered appropriate for this study upon which it is possible to test and validate the proposed research model empirically and to pinpoint the critical determinants for the adoption of e-market in Australian SMEs. For serving these purposes, a survey of top executives in Australian SMEs is set to collect data regarding the adoption of e-market in Australian SMEs nationwide in three months.

The process is carried out in three steps. First, a sample of 900 SMEs targeted all eight Australian industries was selected from a database rented from D&B Australia. SMEs in Australia are defined as the organizations with less than 200 employees (ABS, 2007). The name, email address and mail address of the top executives in SMEs were derived. Then, an initial e-mail was sent out to explain the purpose of study and invitation to participate. 197 of these e-mails were undeliverable. Approximately two weeks after the initial e-mail, mails were sent out to follow up the rest of the potential respondents. 71 were declined due to incorrect address or organization no longer in business. A total of 229 responses were received in both rounds. 16 were unusable hence removed from the analysis, leaving 212 usable responses with a 33.5% response rate.

Construct operationalization

The operational measures of the constructs are shown in Table 1. The decision of adopting an e-market is measured as a dichotomy, represented by 1 or 0 binary number. SME is classified as an adopter if they have adopted an e-market and non-adopter if they have not. Size of SMEs is measured by the number of employees ranged from 1 to 200. Other variables are operationalized as multi-item constructs, either measured using a seven-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7), or measured by multiple choices of the preference. Table 1 summarizes the measurement of constructs and their origins.

Table 1. E-Market Adoption Constructs, Operational Measure and Sources

Construct	Operational Measure	Sources
Dependent Variable		
Adoption	Dichotomy	1 = e-market adopter, 0 = e-market non-adopter
Independent Variable		
Perceived direct benefit	Multi-items, Likert scale	Tan and Nah (2003), Joo and Kim (2004)
Perceived indirect benefit	Multi-items, Likert scale	Kuan and Chau (2001), Joo and Kim (2004)
Size	Number of employees	ABS (2007)
Organization readiness	Multi-items	Kuan and Chau (2001), Teo et al. (2009)
Top management support	Multi-items, Likert scale	Ramdani et al. (2009)
External pressure	Multi-items, Likert scale	Chwelos et al. (2001), Kuan and Chau (2001), Joo and Kim (2004)
E-market trust	Multi-items, Likert scale	Pavlou and Gefen (2004), Verhagen et al. (2006)
Trading partner trust	Multi-items, Likert scale	Pavlou and Gefen (2004), Verhagen et al. (2006)

General profile and summary statistics

Most respondents are from Manufacturing (25.1%), Construction (16.3%) and Trading (13.5%) industry. The size of the responding SMEs is measured by the number of employees. The distribution of industry and size in the responding SMEs is shown in Figure 2. 74.4% respondents are Managing Director or CEO in SMEs, suggesting a high quality of data source. 86.5% of the responding SMEs have been in business for more than ten years. Many (84.7%) SMEs own their websites. The main functions of the website are for company information demonstration and products listing. In terms of the way that SMEs conduct selling or buying activities, only 37.7% of the responding SMEs have adopted one or more e-market, 91.2% of the SMEs are still using the traditional face to face method. In those SMEs that have adopted the e-market, the preferred type of e-market is

the seller dominated e-market (79.0%). The third party dominated e-market which is believed to be suitable for SMEs (Molla and Licker, 2005) attracts only 11.1% of the respondents.

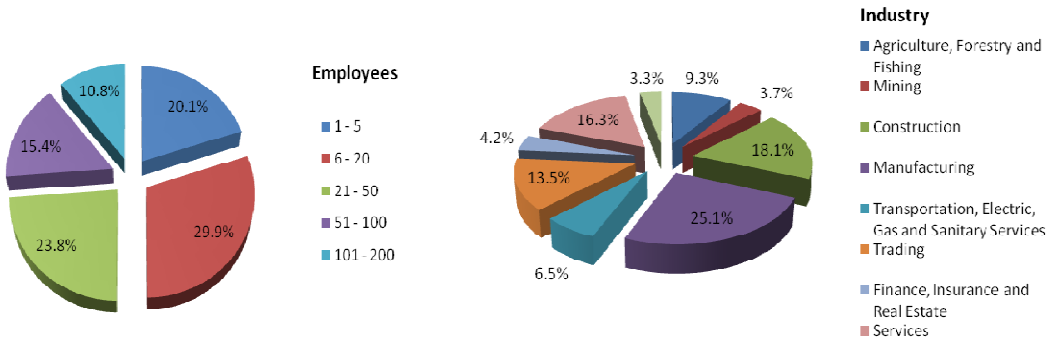

Figure 2: Distribution of size and industry in responding SMEs

Measurement model validation

The SEM technique is adopted for assessing the validity and reliability of the measurement model proposed in Figure 1 before the model can be used for further hypothesis testing. The use of SEM is mainly due to its ability to include latent variables to represent unobserved concepts while accounting for the measurement error in each (Hair et al., 2010) and its capability of simultaneously assessing the multiple correlations and covariance among variables when performing the model validity check.

A confirmatory factor analysis (CFA) on the measurement model is conducted by using AMOS 8.0 based on the results of survey data from 212 samples. The process involves in three steps. The first step is the model specification process, in which the adequate sample sizes of 212 and the multivariate normality distribution in the data set guarantee the use of the maximum likelihood method in the estimation. The second step is an iterative model modification process for developing a best set of items to represent a construct through refinement and retesting. This results in dropping the items that do not meet the validity and reliability test. The last step is to estimate the goodness of fit (GOF) parameters of the overall model to test the extent to which the data support the research model. The most commonly used parameters are the likelihood ration chi-square (χ^2), the ratio of χ^2 to degrees of freedom (χ^2/df), the root mean square error of approximation (RMSEA), and comparative fit index (CFI).

Table 2 shows the results of CFA analysis on the measurement model. The convergent validity and discriminant validity check are performed in the iterative model modification process. The convergent validity assesses the extent to which the items measuring a construct converge together and measure a single construct. The discriminant validity measures the degree to which the items of theoretically distinct concepts are unique from each other (Hair et al., 2010).

Table 2. The Measurement Model Validation Statistics

Construct	Item	FL	IR	χ^2/df	*p*	CFI	RMSEA	α
Perceived Direct Benefit (PDB)	PDB3	0.92 ***	0.85	0.48	0.62	1.00	0.000	0.91
	PDB5	0.92 ***	0.85					
Perceived Indirect Benefit (PIB)	PIB3	0.75 ***	0.56	0.12	0.89	1.00	0.000	0.85
	PIB5	0.81 ***	0.66					
	PIB6	0.86 ***	0.74					
Organization Readiness (OR)	OR4	0.98 ***	0.96	0.28	0.59	1.00	0.000	0.98
	OR6	0.98 ***	0.96					
Top Management Support (TMS)	TMS1	0.87 ***	0.75	1.66	0.20	1.00	0.050	0.86
	TMS2	0.87 ***	0.75					
External Pressure (EP)	EP1	0.86 ***	0.74	0.00	1.00	1.00	0.000	0.85
	EP3	0.86 ***	0.74					
Trust (T)	T1	0.87 ***	0.76	0.24	0.78	1.00	0.000	0.85
	T2	0.90 ***	0.81					
	T3	0.69 ***	0.48					
Full Measurement Model				1.24	0.10	0.99	0.034	
Recommended Value		**≥ 0.7**	**≥ 0.5**	**≤ 3.0**	**≥ .05**	**≥ 0.9**	**≤ .08**	**≥ 0.7**

The convergent validity assessment includes three steps. The first step is to calculate the χ^2 values for each of the constructs. If any χ^2 rejects a factor at $p < 0.05$, modification indices are used to identify the common factors among items. The last step is to drop those items that do not fit into any factor from the subsequent analysis. The factor loading (FL) value is also computed during the convergent validity check process. A rule of thumb is that the FL should be at least 0.50, and ideally 0.70 or higher with all FLs statistically significant. Following the rules described as above, 11 items are dropped from 37 items in the original conceptual model. Other items with FLs ranged from 0.69 to 0.98 shown in Table 2 indicate high convergent validity.

The discriminant validity of the constructs is checked by comparing the average variance extracted (AVE) for each construct with the squared correlation of this construct to any other constructs (Hair, 2010). The AVE should be greater than any of the squared correlation for that construct to show adequate the discriminant validity. In the process of the assessment, two constructs namely e-market trust and trading partner trust are highly correlated to each other with less discriminant power. They are therefore suggested to be combined as a new construct, given the name trust. 9 items are dropped in the discriminant validity process, resulting in 14 items in 6 constructs for the final conceptual model. Table 3 shows the correlation matrix between the constructs. All 6 constructs demonstrate high discriminant validity with AVE ranged from 0.65 to 0.96.

Table 3. An AVE and Squared Correlation Matrix

	PDB	PIB	OR	TMS	EP	T
PDB	**0.85**					
PIB	0.55	**0.65**				
OR	0.15	0.17	**0.96**			
TMS	0.32	0.39	0.30	**0.75**		
EP	0.19	0.53	0.09	0.60	**0.74**	
T	0.52	0.57	0.09	0.54	0.53	**0.68**

The reliability check of the constructs includes the assessments of the item reliability and the construct reliability. The item reliability (IR) indicates the amount of variance in an item due to underlying construct rather than error (Chau, 1997). It is assessed using the squared multiple correlation value or the square of the standardized FL. An item is considered to be reliable if IR is greater than 0.50 (Hair, 2010). IR values in Table 2 for all the items ranging from 0.56 to 0.96 is higher than the threshold therefore deemed to be sufficient measuring the constructs. The construct reliability measures the degree of consistency between multiple items of a construct. It is tested by calculating Cronbach's alpha coefficients with an acceptable value of 0.70. All 6 constructs show high Cronbach's alpha coefficients ranged above 0.85, construct reliability is thus considered to be strong.

The GOF of the final measurement model is assessed after various validity and reliability tests discussed above. The insignificance of parameters χ^2 73.39 and χ^2/df 1.24 within the acceptable value χ^2/df 3.00 indicate that the final research model is not significantly different from the survey data. The RMSEA value 0.034 less than the recommended value 0.08 as well as the CFI value 0.99 greater than the threshold 0.90 also exemplify a good match between the final measurement model and the survey data. The final measurement model consisting 14 items in 6 factors is therefore suitable to proceed for further hypothesis testing.

DATA ANALYSIS AND RESULTS

Logistic regression

Logistic regression analysis is applied to test the research hypotheses empirically. This multivariate statistical technique is chosen over other analysis methods because the dependent variable is dichotomous (Hair, 2010). By maximizing the likelihood of the adoption decision represented by binary number 0 or 1, the significance and contribution of each independent variable is estimated. Based on the validated model for the adoption of e-market in previous section, the logistic regression model can be defined as follows:

$$P\ (Adoption = 1) = \Lambda\ (\beta_0 + \beta_1 \cdot PDB + \beta_2 \cdot PIB + \beta_3 \cdot S + \beta_4 \cdot OR + \beta_5 \cdot TMS + \beta_6 \cdot EP + \beta_7 \cdot T + \varepsilon)$$

Where $\Lambda\ (\cdot)$ denotes the probability density function of the logistic distribution. β_1 to β_7 represent the estimated coefficients between the independent variables and dependent variable. The independent variables are measured by the summated scales of corresponding items shown in Table 2. ε is the measurement error involved in the parameter estimation process. Testing the hypotheses is equivalent to testing whether coefficients β_1 to β_7 are non-zero. Significant and positive coefficients imply strong support of the research hypothesis. The higher value of coefficient, the more influence of corresponding independent variables to the adoption decision.

There are four statistical tests involved in this stage for providing a reliable hypothesis testing result, including (a) a χ^2 test for the change in -2 times the log of the likelihood (*-2LL*) value from the base model, (b) Hosmer and Lemeshow test of model fit and the explanation power, (c) wald statistic estimation and (d) classification ability test. The test results are summarized in Table 4.

Table 4. Statistical Results of Logistic Regression Model

Estimates				
Factor	**Coefficient (β)**	**Wald**	***p*-value**	**Support for model**
Perceived direct benefit	0.20*	5.13	0.023	H1: Yes
Perceived indirect benefit	0.01	1.59	0.208	H2: No
Size	0.24	0.08	0.784	H3: No
Organization readiness	0.04	2.07	0.150	H4: No
Top management support	0.68***	22.85	0.000	H5: Yes
External pressure	0.25*	4.06	0.044	H6: Yes
Trust	0.09**	8.55	0.003	H7: Yes
Goodness-of-fit				
Final (*-2LL*) = 185.52		Δ (*-2LL*) = 68.98***		
Hosmer-Lemeshow χ^2 = 12.03		*p = 0.15*		
Pseudo R^2 = 0.27		Cox and Snell R^2 = 0.26		Nagelkerke R^2 = 0.35

Classification Ability		**Predicted**		**% Correct**
		Non-adopter	Adopter	
	Observed			
	Non-adopter	117	15	88.6
	Adopter	39	41	51.3
	Overall			74.5

****p≤0.001, **p≤0.01, *p≤0.05.*

The χ^2 test for the deduction of *-2LL* value is conducted to assess if the set of the independent variables in the research model is significant in improving the model fit (Hair, 2010). A null base model is first created to act as the baseline for making comparisons of the improvement in model fit with the research model. The independent variables with the greatest reduction of *-2LL* value are then selected in the forward stepwise model selection procedure. The χ^2 and its significance for the deduction of *-2LL* value from the base model to the research model can be computed in the process to show the improvement of the model estimation fit. The significant deduction of *-2LL* shown as Δ (*-2LL*) with *p≤0.001* in Table 4 reflects a great improvement from the null base model to the research model, therefore demonstrates an adequate model fit.

The Hosmer-Lemeshow test is another χ^2 test to compare the research model with the perfect base model that can classify respondents into their respective groups correctly (Zhu et al., 2003; Hair, 2010). An insignificant Hosmer-Leshow χ^2 (χ^2 *= 12.03, p = 0.15*) implies that the research model is not much difference from the perfect base model. In addition to the χ^2 value, three R^2 measures including Pseudo R^2, Cox and Snell R^2 and Nagelkerke R^2 are calculated to measure the explanatory power of the model based on the reduction in the *-2LL* value. Nagelkerke R^2 of 0.35, for example, represents 35% of the change in the dependent variable due to the reduction of *-2LL* value performed in the previous step can be explained by the proposed research model. The insignificant Hosmer-Leshow χ^2 and satisfactory R^2 suggest a good model fit with a satisfactory explanation capability.

The Wald statistic test is performed to measure the level of significance of individual coefficients (Ramdani et al., 2009; Hair, 2010). The results from Table 4 indicate that four of the seven variables namely perceived direct benefit, top management support, external pressure and trust emerge as significant determinants of the adoption of e-market, among which top management support is the critical determinant with strongest significant *p* value *0.000* and highest coefficient 0.68. Whereas perceived indirect benefit, size and organization readiness have less effect, even though the correlation of 0.24 between size and the adoption is higher than most of the other determinants. The results thus provide support for hypothesis 1, 5, 6 and 7.

The classification ability test is used to assess the predictive accuracy of the model in classifying the respondents into the correct groups (Hair, 2010). In our study it examines the capability of the research model to correctly classify the adopters and non-adopters into their perspective groups. Based on the observation-prediction section in Table 4, the rate of correct predications by the logistic model and that by random guess is computed. The logistic model has an overall prediction accuracy of 74.5%. As there are 80 adopters and 132 non-adopters, the classification accuracy by random guess would be $(80/212)^2 + (132/212)^2 = 53.09\%$. Thus, the logistic model is claimed to have much higher classification ability.

Analysis

The perceived direct benefit, top management support, external pressure and trust have been found to be significant determinants of the adoption of e-market in SMEs from the logistic regression analysis, among which top management support is the most critical. On the other hand, it is somewhat surprisingly that organization readiness and size are found to be insignificant associated with the adoption of e-market in this study. The perceived indirect benefit is also less influential to the decision of adopting an e-market in SMEs.

The significant impact of the perceived direct benefit on the adoption of e-market in Australian SMEs is in line with previous findings in the IS innovation literature (Kuan and Chau, 2001; Ramdani and Kawalek, 2009). The positive relationship between the direct benefit and the adoption of e-market suggest that e-market is considered by SMEs as a tool to gain direct and immediate benefits such as increasing the day-to-day operational efficiency, reaching larger number of customers or suppliers and saving cost. Compared with the insignificance of the indirect benefit to the adoption of e-market, a conclusion can be drawn that SMEs is more concerned with the immediate short term benefits that e-market can bring instead of the long term indirect benefits. This sheds light on the e-market service provider that in order to promote the adoption of e-market in SMEs, a greater effort should be placed on broadcasting the direct benefits that e-market can bring to the business.

The perceived indirect benefit is not significant in affecting SMEs' decision in adopting an e-market in this study. One possible reason is the lack of awareness of those indirect benefits by SMEs in general. This result is consistent with the findings by Iacovou et al. (1995) and Kuan and Chau (2004), suggesting that the indirect benefits of new technology are not recognized as a competitive advantage in small businesses because small businesses are less informed compared to large organizations. More promotional effort would therefore be needed to increase the awareness of these benefits of e-market in order to attract SMEs in adopting e-market. Another explanation for the insignificance of the indirect benefits might be that even e-market is able to provide indirect benefits to SMEs, it falls behind SMEs' expectations and therefore the perceived indirect benefit does not result in a positive adoption decision. If this is the case, not only is it important for e-market service providers to provide information on positive indirect benefits to SMEs, but it is also important that such benefits match or even exceed the expectation of SMEs.

The Size of SMEs is always considered as a critical determinant of technology adoption in the literature (Teo and Pian, 2003, Ramdani and Kawalek, 2009). Larger organizations have a greater propensity to adopt the new technology than the smaller ones due to the greater financial resources and technical expertise they have in taking risks with new technology. However, this study shows it is not the case in the adoption of e-market. This finding is consistent with the study of internet adoption in SMEs by Mehrtens et al. (2001). The lower adoption cost and the maintenance needs of websites compared to other technologies decrease the importance of size to the adoption decision. This is true in the adoption of e-market, as the cost and the technical requirements of adopting e-market is much lower than other high-end technologies such as EDI or enterprise resource planning. Most SMEs are able to afford to adopt an e-market. Moreover, the penetration of Internet among Australian SMEs (Stockdale and Standing, 2004) also reduces the barrier to the adoption of e-market in the sense that Internet is the platform for conducting e-market activities. Size may therefore be less of a key determinant in the adoption of e-market.

The top management support is the most critical determinant of the adoption of e-market in this study. This is consistent with nearly all the previous technology adoption studies (Premkumar, 2003; Ramdani and Kawalek, 2009). In SMEs, the primary decision maker is the owner or manager of the business, their understanding and support guarantee the limited resources to be allocated for the adoption of technology, as well as creating a supportive climate in overcoming the barriers and resistance to adoption. The strong relationship between top management support and the adoption of e-market indicates that in order to promote the adoption of e-market in SMEs, it is essential to communicate with the top management the potential benefits of e-market.

The organization readiness is another factor found to be insignificant in affecting the decision of adopting an e-market. In this study, organization readiness is determined by the financial readiness and technological readiness. The possible reason of the insignificance effect is due to the less financial and technical requirements involved in the adoption of e-market compared to other high-end technologies discussed above. This is in line with the previous studies in online technology adoption. In an Internet adoption study in SMEs (Mehrtens et al., 2001), financial readiness is not raised as an issue because most of the internet adoption is accomplished in house with no appreciable expenses incurred. In another online stock trading adoption research, Chan and Mills (2002) find insufficient support to conclude that organization readiness is the key determinant.

The external pressure shows a significant relationship with the adoption of e-market. The importance of external pressure is consistent with the previous studies such as Kuan and Chau's (2004) study of electronic data interchange adoption in small businesses and Teo et al.'s (2009) study in e-procurement services. In this study, the positive relationship between external pressure and the adoption of e-market reveals that Australian SMEs

are more prone to adopt e-market in order to maintain their competitive position and their relationship with trading partners. The adoption of e-market by the influential trading partners or competitors would accelerate their decision in adopting one-market. This sheds the light on the e-market service provider that in order to promote the adoption of e-market in SMEs, some free adoption offers and incentives could be given to the influential parties first. After realizing the benefits of e-market, the influential parties are able to encourage or force smaller businesses to adopt e-market as well. In addition, the assistance from government through the development of a series of polices and programs for improving the economic environment and growth prospects for SMEs also facilitates the adoption of e-market.

Trust correlates significantly with the adoption of e-market. This finding is consistent with the previous research in online technology adoption such as electronic file adoption (Schaupp and Carter, 2008) and mobile commerce adoption (Wei et al., 2009). In the adoption of e-market, trust involves the trustworthy of e-market itself as well as of other trading parties. In order to increase the adoption rate of e-market among SMEs, the e-market service provider should consider not only to promote the trust of SMEs in e-market by enhancing the online transaction security control, such as including escrow services to control the payment process and credit card guarantee services to safeguard the transaction, but also to boost the trustworthy between trading parties by providing accurate and reliable information to each other.

CONCLUSION

This study investigates the critical determinants for the adoption of e-market in Australian SMEs within the TOE framework. Specifically, the key determinants in order of importance are top management support, trust, external pressure and perceived direct benefit. Surprisingly size and organization readiness are less influential in the decision in adopting an e-market. The results of this study provide SMEs a profound insight into the issues involved in the adoption of e-market. It also shed the light on the ways to promote the adoption rate of e-market in SMEs, such as informing the top management the possible benefits of adopting an e-market, and building effective mechanism to enhance the online security for boosting SME's trust in the e-market.

There are certain limitations of this study. First, this study only investigates the issues and critical determinants involved in the e-market adoption stage. In order to gain a holistic understanding of the e-market to SMEs, the impact of e-market on SMEs performance should be examined. Second, this study does not distinguish the adoption of e-market between Australian metropolitan and rural areas. SMEs located in rural areas by the nature and location owns specific characteristics compared to the metropolitan SMEs such as limited access to resources and less influenced by external pressure (MacGregor and Vrazalic, 2005). The issues of their concern in the adoption of e-market might be different from those located in metropolitan areas.

The future research can address the above limitations by investigating the post adoption stage of e-market in SMEs as well as conducting a comparison study of the adoption of e-market between metropolitan area and regional area. Additionally, size and organization readiness are critical determinants in most of the technology adoption studies, whereas in this study they are found to be insignificant. In order to triangulate this finding and explore the insights of their contribution to the adoption of e-market, qualitative research such as interviews or focus group can be conducted.

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